ONTARIO MINISTRY OF ENVIRONMENT
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OPERATING SUMMARY

1972

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1972
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OWEN SOUND

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Owen Sound : water pollution
control plant.

81783

Ontario

Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D.S. Caverly,
Assistant Deputy Minister.

D McTavish

D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable James A.C. Auld

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
D.S. Caverly

EXECUTIVE DIRECTOR
K.H. Sharpe

PROJECT OPERATIONS BRANCH

DIRECTOR
D.A. McTavish

ASSISTANT DIRECTOR
C.W. Perry

REGIONAL SUPERVISOR
P.J. Osmond

OPERATIONS ENGINEER
A. Clark

135 St. Clair Avenue West
Toronto 195

OWEN SOUND
WATER POLLUTION CONTROL PLANT

operated for

THE CITY OF OWEN SOUND

by the

MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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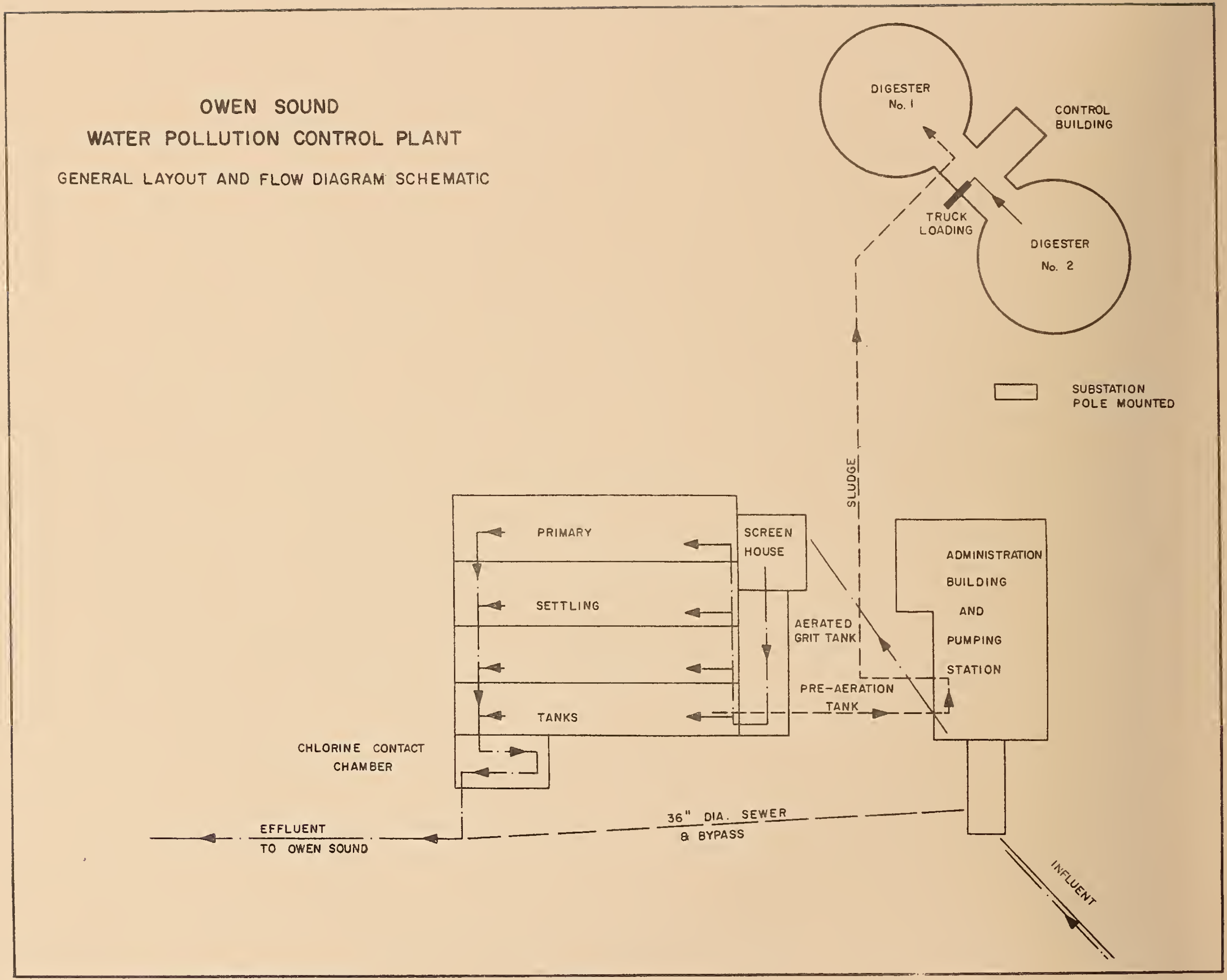


OWEN SOUND
WATER POLLUTION CONTROL PLANT
GENERAL LAYOUT AND FLOW DIAGRAM SCHEMATIC

DESIGN DATA

PROJECT NO.	2-0069-60
TREATMENT	Primary
DESIGN FLOW	3.0 mgd
DESIGN POPULATION	25,000
BOD - Raw Sewage	180 mg/l
- Removal	40%
SS - Raw Sewage	200 mg/l
- Removal	65%

SEWAGE PUMPING STATION

Screening

- 1 3/4" spacing

Pumps

Type: Worthington
Size: Three 3150 gpm @ 33' tdh
(One diesel standby)

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: One Model C (36")

Grit Removal

Type: Aerated
Size: One 18½ X 13 X 12' (18,000 gal)
Retention: 8.6 min

Pre-aeration Tank

Size: One 23' 9" X 13 X 12'
(23,400 gal)
Retention: 11.2 min

Air Supply

Type: Sutorbilt
Size: Two 408 scfm @ 6 psi

Primary Sedimentation

Type: Rex Linkbelt
Size: Two 78 X 32 X 12½'
(388,000 gal)
Retention: 3.11 hr
Loading: Surface, 600 gal/ft^2/day
Weir, 8,260 gal/ft/day

CHLORINATION

Type: W & T
Size: One 2000 lb/day

Chlorine Contact Chamber

Size: One 31 X 14 X 8' (21,700 gal)
Retention: 11.2 min

OUTFALL

- 828' to Owen Sound

SLUDGE HANDLING

Digestion System - Two-stage

Primary --
Type: PFT with one Sutorbilt compressor
Size: One 40' dia x 25' swd (31,400 cu ft or 0.196 mil gal)
Loading: 2.75 lb/cu ft/mo

Secondary --
Size: One 40' dia x 24½' swd (30,800 cu ft or 0.192 mil gal)
Total Loading: 1.88 lb/cu ft/mo

WEST SIDE PUMPING STATION

One - 3916 gpm Chicago Pump
Two - 1000 gpm Smart-Turner
Standby - Diesel generator

'72 Review

GENERAL

The Owen Sound sewage project consists of a 3.0 mgd primary water pollution control plant and a pumping station. Plant staff also operate one of the four City owned pumping stations. Project 2-0068-60 consists of storm interceptor sewers with seven control structures. These structures are inspected by Ministry plant staff and cleaned by City forces. All of the remaining sewers are owned by the City and maintained by City forces.

Plant effluent is discharged to the Sound. Sludge is digested anaerobically and hauled by tank truck for land disposal. The costs shown in the body of this report are for the operation of the plant and two pumping stations and inspection of the storm sewer control structures.

EXPENDITURES

The 1972 operating costs were $64,101.72, an increase of 3 percent over the previous year. The unit cost of treatment was $45 per million gallons as compared to $48 per million gallons in 1971.

PLANT FLOWS AND CHLORINATION

Approximately 1420 million gallons of sewage was treated in 1972. Flows during several months of the year have been estimated, as the plant flow meter was out of service for repairs. Flow was frequently in excess of the meter capacity and the excess flows are not recorded. Peak flow rates often exceeded 10 mgd. Average daily flows exceeded the plant design capacity 85 percent of the time, relatively unchanged from 1967 to date. The average flow during the year was 130 percent of plant design capacity.

A total of 37, 500 pounds of chlorine was used at an average dosage of 2.6 mg/l to maintain a minimum residual of 0.5 mg/l in the plant effluent after a 15 minute contact period.

PLANT EFFICIENCY

The average raw sewage BOD increased from 90 mg/l in 1971 to 99 mg/l in 1972. This BOD concentration is quite low in comparison to normal raw sewage. The average suspended solids concentration increased slightly from the 1971 level of 214 mg/l to 217 mg/l in 1972. The suspended solids contain an unusually high proportion of sand, silt and clay in comparison to plants in other municipalities. All of these factors indicate a considerable amount of the flow, probably of the order of 50 percent of the total flow, results from infiltration to sewers and surface run-off.

Plant efficiency remained high for a primary plant during 1972 despite the high flows, with BOD reductions of 60 percent and suspended solids reductions of 86 percent. Plant effluent contained an average of 40 mg/l of BOD and 31 mg/l of suspended solids. The plant effluent BOD was an improvement over the previous year and the effluent suspended solids was similar to the 1971 level.

Phosphorus levels entering the plant in 1972 averaged 6.0 mg/l and the plant effluent averaged 3.2 mg/l of phosphorus. These concentrations are both similar to the 1971 levels. Removal of phosphorus to the 1.0 mg/l level will be required by the end of 1973.

SOLIDS HANDLING

The grit removal facilities are now operating above capacity and 1743 cubic feet of grit was removed from the system, considerably greater than the 1299 cubic feet removed in 1971. A considerable quantity of this material is carried beyond the grit removal facilities due to the frequent excessive flows, enters the primary clarifiers and is pumped to the digesters.

During 1972, a total of 7261 cubic yards of digested sludge was hauled from the plant to land disposal.

CONCLUSIONS

There continues to be a need for an extensive sewer separation program to intercept storm flows entering the sewer system and thereby reduce the flow peaks reaching the plant. The plant operates efficiently even under the existing hydraulically overloaded conditions, except during these periods of peak flow.

Plant scale testing by Ministry staff of alternative chemicals for the use in phosphorus removal will be carried out early in 1973 and arrangements will be made to have a permanent installation completed and in operation by the end of the year. It is anticipated that the phosphorus removal programme will have side benefits in improve the plant efficiency for the removal of BOD and suspended solids. However, experience to date at other plants indicates that there are hydraulic limitations associated with the use of all phosphorus removal chemicals. Improved plant efficiency, and an acceptable level of phosphorus in the plant effluent are expected to be obtainable only up to a certain level of plant flow. Above this flow the efficiency and effluent quality both can be expected to deteriorate rapidly.

Considerations of plant expansion should be held in abeyance pending the results of the phosphorus removal tests at the plant.

PROJECT COSTS

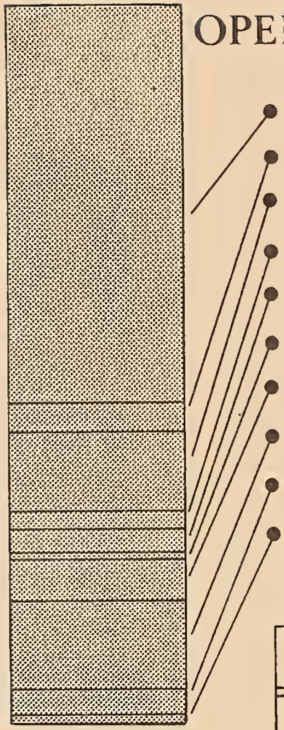
NET CAPITAL COST	$1,468,243.18
DEDUCT - Portion financed by CMHC	(996,392.74)
Municipal Advances	(30,758.65)
Long Term Debt to MOE	$ 441,091.79
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	$ 115,594.19
Net Operating	$ 63,684.04
Debt Retirement	4,398.00
Reserve	7,185.55
Interest Charged	24,735.97
TOTAL	$ 100,003.56

RESERVE ACCOUNT

Balance @ January 1, 1972	$ 61,089.40
Deposited by Municipality	7,185.55
Interest Earned	4,095.99
	$ 72,370.94
Less Expenditures	3,962.43
Balance @ December 31, 1972	$ 68,408.51

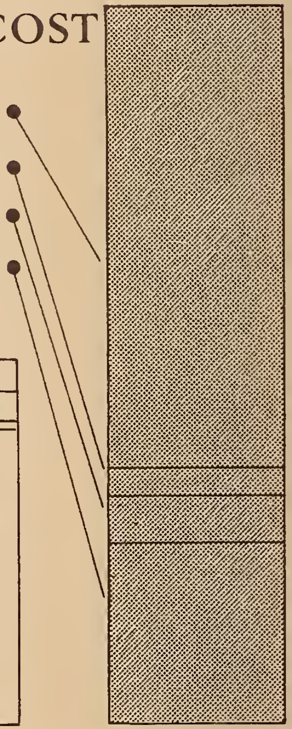
1972 COSTS

OPERATING COSTS



PAYROLL	56 %
FUEL	3 %
POWER	11 %
CHEMICALS	2 %
GENERAL SUPPLIES	3 %
EQUIPMENT	< 1 %
REPAIRS & MAINTENANCE	6 %
SUNDRY	14 %
WATER	3 %
TRAVEL	1 %

TOTAL ANNUAL COST



NET OPERATING	64 %
DEBT RETIREMENT	4 %
RESERVE	7 %
INTEREST	25 %

YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS $ per million gal	TREATMENT COSTS ¢ per lb BOD
1968	1442.50	48,466.97	33.60	4 cents
1969	1475.20	53,549.66	36.30	5 cents
1970	1387. (est)	60,198.42	43.40	6 cents
1971	1280	62,104.93	38.50	13 cents
1972	1427.4 *	64,101.75	44.90	6 cents

* Estimate

MONTHLY OPERATING COSTS

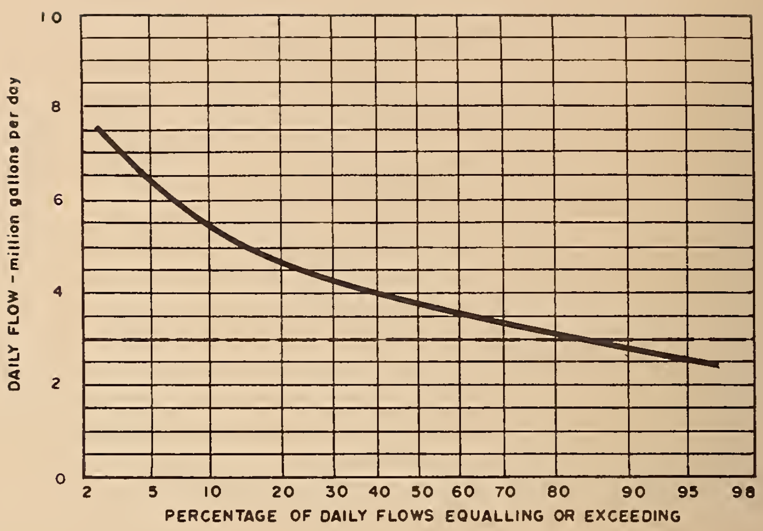
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	2649.27	2559.25		34.50			16.07					39.45
FEB	5722.28	2683.57		161.00	628.08	19.40	296.59	189.89	911.60	714.95	90.20	27.00
MAR	4981.02	2626.39		264.50	594.81		50.15		670.74	665.03	88.40	21.00
APR	4752.97	2831.91		98.14	662.11		347.55		158.47	623.21	3.53	28.05
MAY	5557.85	2775.20		161.69	813.26		114.93	9.40	434.38	693.65	526.24	29.10
JUNE	6088.59	3902.94		97.75	678.11		177.59		355.18	873.66	3.36	
JULY	2100.62	75.66		349.60	722.06		64.26		219.49	140.30	470.60	58.65
AUG	4485.90	2647.49		80.50	623.90		141.08		160.13	800.19	3.36	29.25
SEPT	6441.92	2780.44		93.20		1509.20	433.80		211.17	1386.21		27.90
OCT	6101.49	3176.63		493.37	1185.72	52.50	162.80	10.50	91.98	692.71	235.28	
NOV	2786.21	154.74			630.13					1550.41	342.58	108.35
DEC	12433.63	9741.90		399.89	723.16		332.97		452.04	742.06	3.36	38.25
TOTAL	64101.75	35956.12		2234.14	7261.34	1581.10	2137.79	209.79	3665.18	8882.38	1766.91	407.00

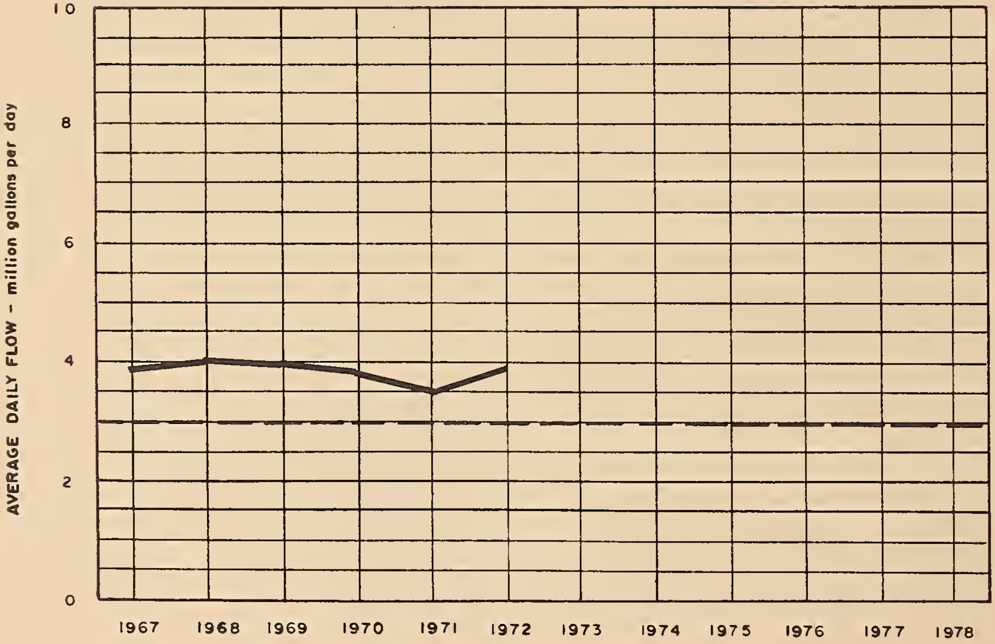
Brackets indicate credit.

* Sundry includes sludge haulage costs of $7,250.40

PROCESS DATA

FLOWS





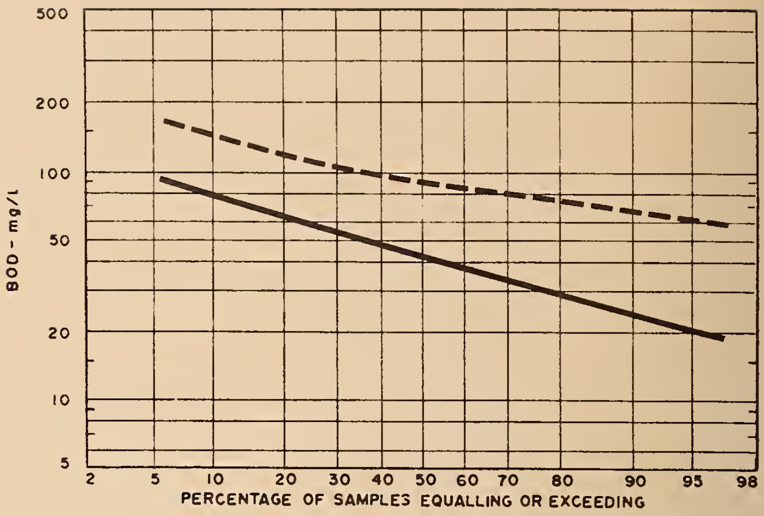
DESIGN CAPACITY - - - - - - - -

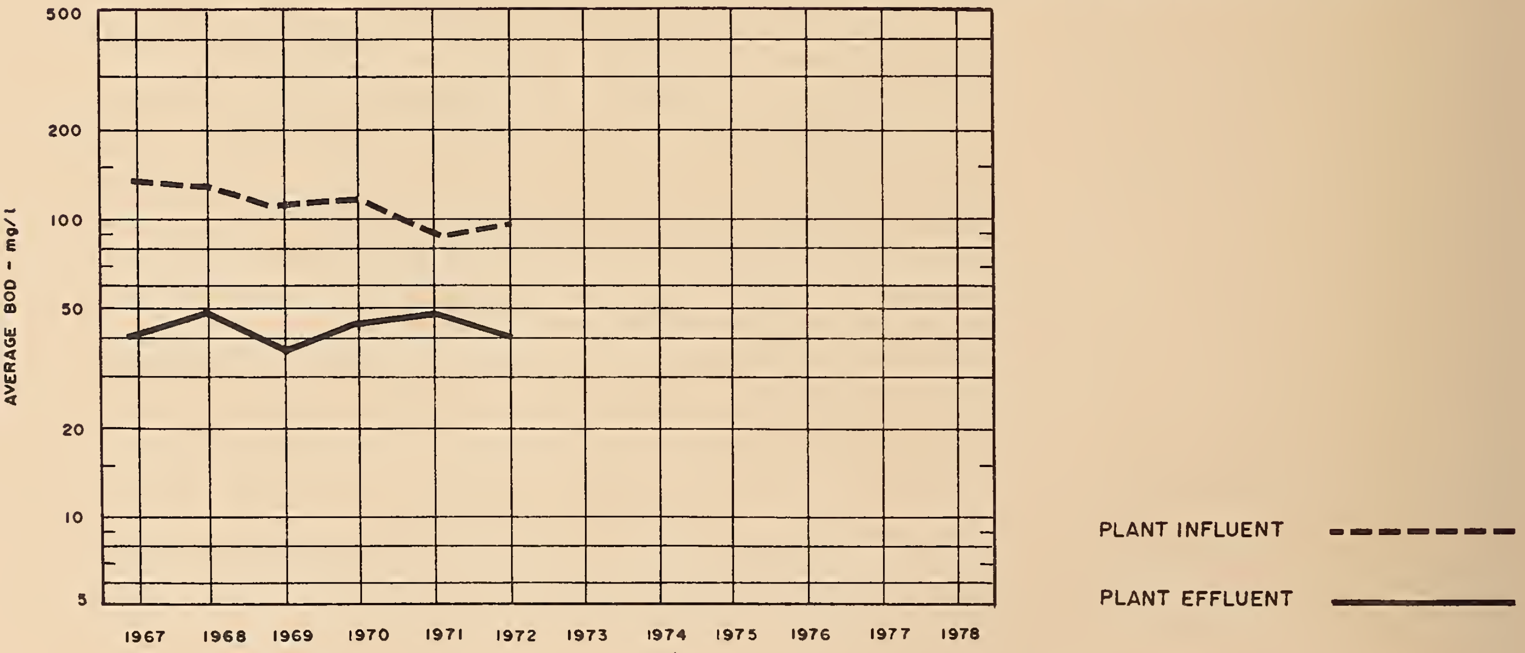
PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN	135	4.3	7.4	85	56	34	39	160	23	86	185	4.4	2.9
FEB	98	3.3	4.0	120	11	91	107	171	21	88	147	5.8	3.2
MAR	136	4.4	7.7	210	50	76	217	304	63	79	328	12.5	3.8
APR	149	5.0	7.8	50	38	24	179	151	52	65	148	2.6	2.0
MAY	100	3.2	4.6	82	46	43	36	181	23	87	158	6.3	4.7
JUNE	103	3.4	5.4	73	45	39	29	206	25	88	186	7.6	3.9
JULY	84 *	2.8	3.2	102	29	72	61	423	30	93	329	4.9	2.3
AUG	-	-	-	115	33	71	-	252	29	88	-	5.8	3.4
SEPT	-	-	-	96	45	53	-	251	26	90	-	6.6	3.5
OCT	-	-	-	108	54	50	-	142	36	75	-	4.5	3.3
NOV	96 *	3.2	5.2	90	44	51	44	197	28	86	162	5.5	2.5
DEC	168	4.4	8.6	80	6	93	124	158	18	89	235	4.5	2.9
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	-	3.9	MAXIMUM 8.6	99	40	60	92	217	31	86	209	6.0	3.2
No. of Samples	-	-	-	23	23	-	-	74	74	-	-	23	23

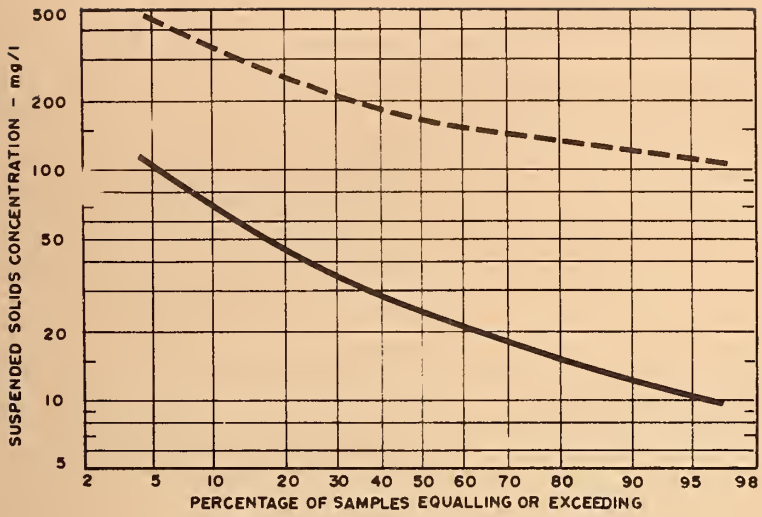
* Estimated

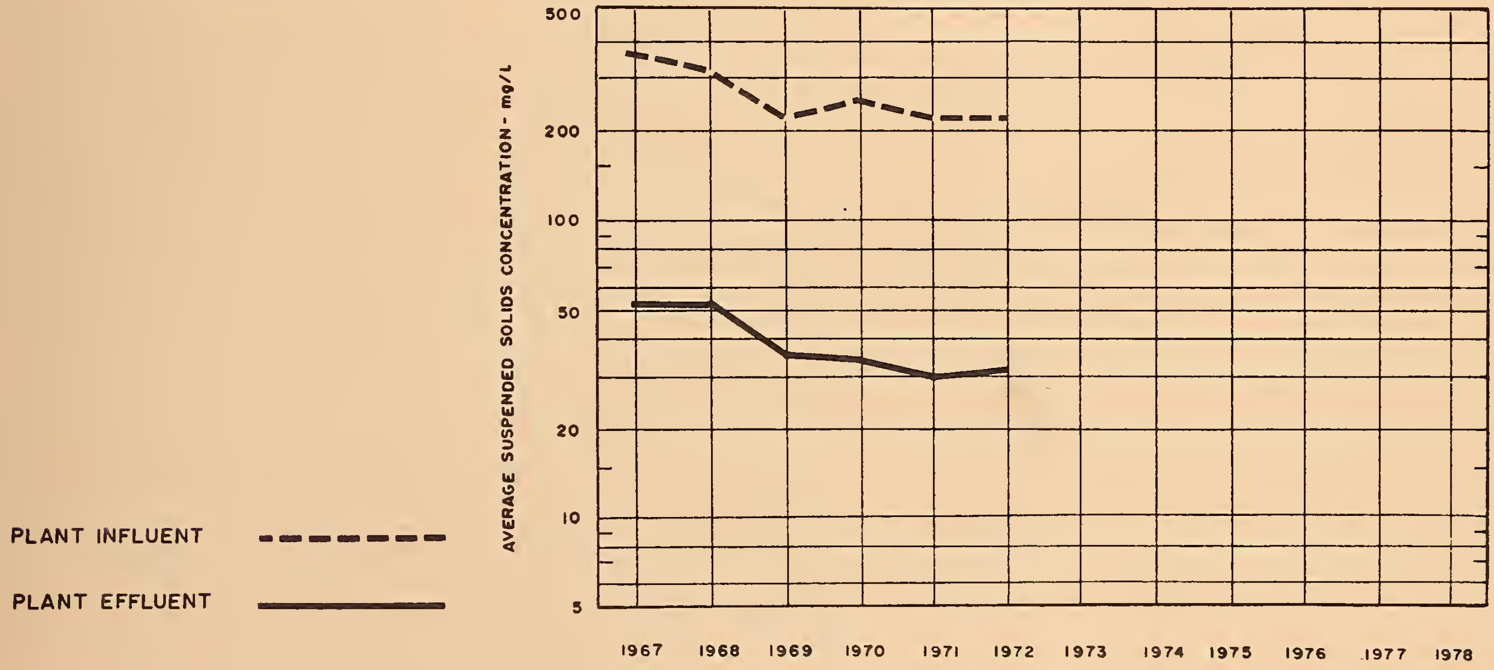
BIOCHEMICAL OXYGEN DEMAND



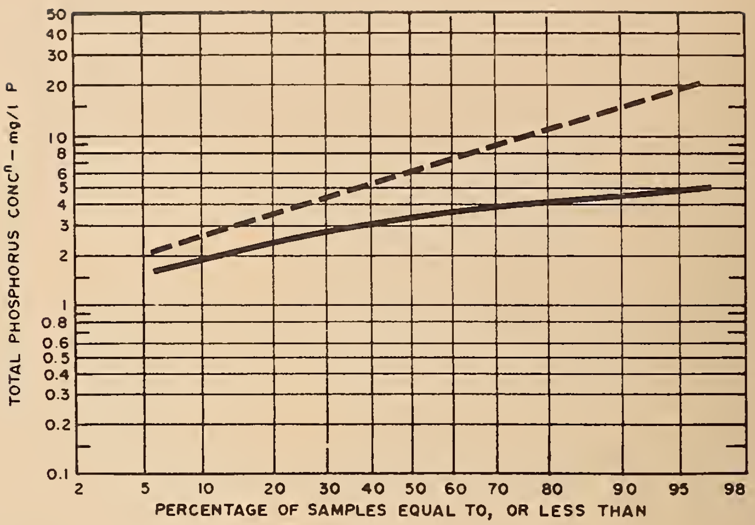


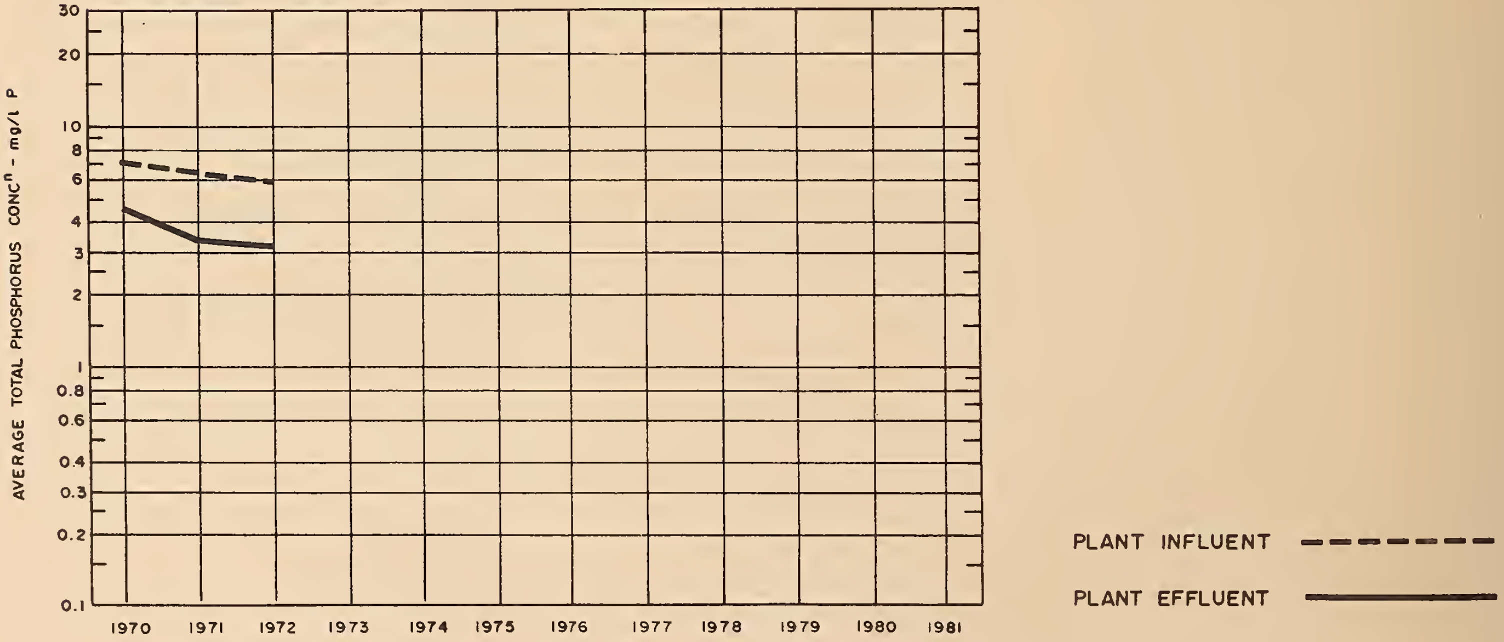
SUSPENDED SOLIDS



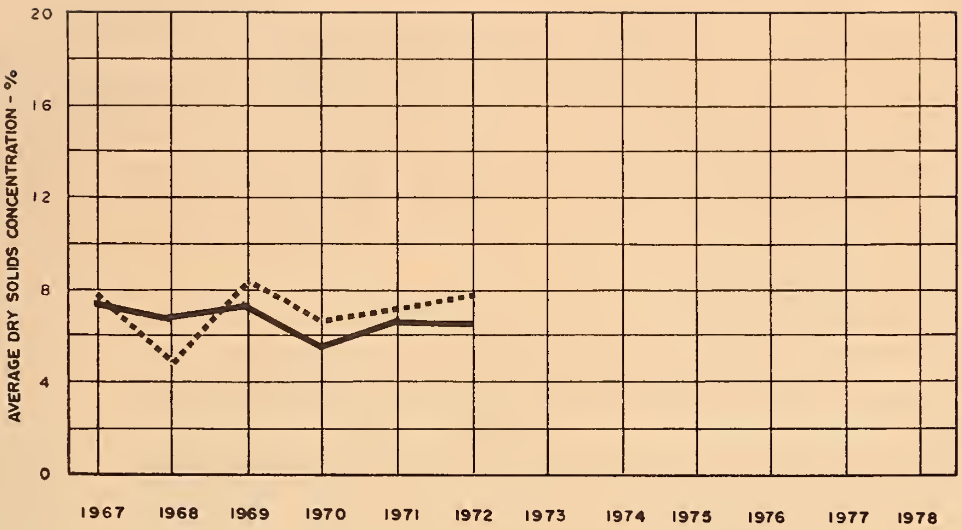


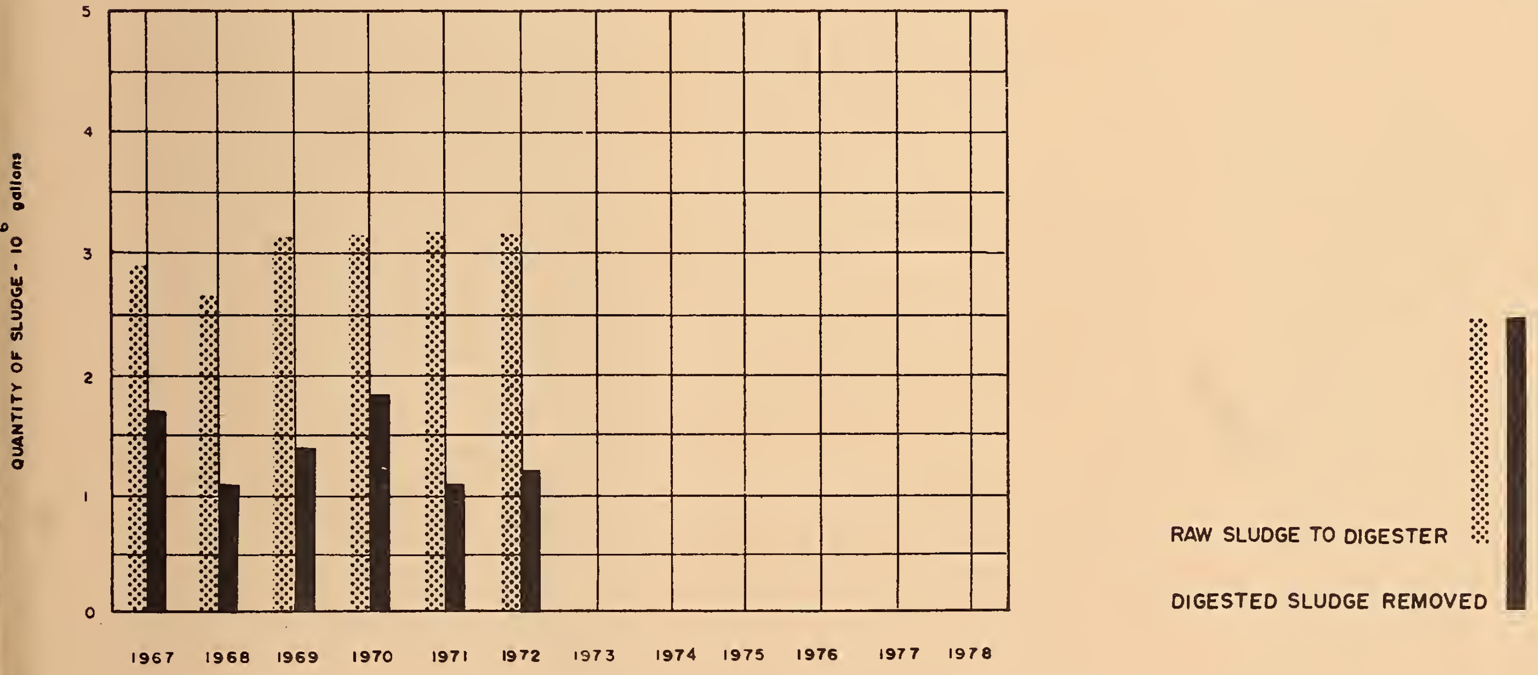
PHOSPHORUS


TOTAL PHOSPHORUS CONC^n – mg/l P
50
40
30
20
10
8
6
5
4
3
2
1
0.8
0.6
0.5
0.4
0.3
0.2
0.1
2
5
10
20
30
40
50
60
70
80
90
95
98
PERCENTAGE OF SAMPLES EQUAL TO, OR LESS THAN


AVERAGE TOTAL PHOSPHORUS CONC^n - mg/l P
30
20
10
8
6
4
3
2
1
0.8
0.6
0.4
0.3
0.2
0.1
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
PLANT INFLUENT
PLANT EFFLUENT

DIGESTION


RAW SLUDGE
DIGESTED SLUDGE
AVERAGE DRY SOLIDS CONCENTRATION - %
20
16
12
8
4
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978


QUANTITY OF SLUDGE - 10^6 gallons
5
4
3
2
1
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED

TREATMENT DATA

	GRIT	CHLORINATION		SLUDGE DIGESTION and DISPOSAL							
				RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	
MONTH	QUANTITY REMOVED cubic feet	CHLORINE USED 10^3 pounds	AVERAGE DOSAGE mg/l	QUANTITY 10^5 gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	QUANTITY REMOVED 10^5 gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	TOTAL SOLIDS %	SLUDGE HAULED cubic yards
JAN	83	3.1	2.3	2.6	7.1	64	1.0	7.5	40	.2	598
FEB	49	2.9	3.0	2.5	6.4	57	.9	5.0	34	.2	520
MAR	191	3.2	2.4	2.7	9.4	41	.8	5.8	33	.1	499
APR	263	3.5	2.3	2.6	13.5	29	.7	9.2	21	.2	389
MAY	104	3.0	3.0	2.7	10.0	48	.9	7.6	22	.1	547
JUNE	173	3.0	3.0	2.5	8.3	52	1.5	4.7	26	.1	869
JULY	180	3.0	3.5	2.6	8.6	46	.8	9.2	27	.1	491
AUG	140	3.2	-	2.7	7.4	49	1.6	6.2	33	.2	929
SEPT	155	2.8	-	2.6	6.0	62	.9	7.3	26	.1	554
OCT	143	3.3	-	2.7	5.3	60	1.0	4.5	34	.1	607
NOV	164	3.3	3.4	2.6	5.8	55	1.0	5.3	31	.1	598
DEC	98	3.2	1.9	2.6	5.1	57	1.1	5.1	31	.1	660
TOTAL	1743	37.5	—	31.4	—	—	12.2	—	—	—	7261
AVG.	1.2 cubic feet/mil gal	3.1	2.6	2.6	7.8	52	1.0	6.5	30	.1	605

Date Due
